RXT-6400

Advanced 400G Test Module

400G Ethernet

NEW

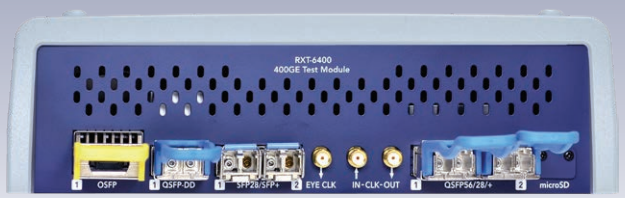
Now supporting OSFP and QSFP-DD Native PAM4 400GE design with best-in-class signal integrity

for RXT-1200+

Modular Test Platform

Native 400GE PAM4 test module, in portable form factor for Lab-to-Field transition

VeEX® RXT is the industry's most flexible, compact, and future-proof handheld test solution for core, metro and access. The RXT-6400 module adds 400G Ethernet testing and future expandability for applications including Transport, Metro, Aggregation, Datacenter inter/intra/cross-connect, Cloud computing, 5G backhaul, and NEMs.



Platform Highlights

The RXT family of modules offer a full range of link and service testing capabilities, from Core to Access, from Lab to Field and from 64k to 400G, with a complete range of communication technologies, including eCPRI, CPRI/OBSAI, OTN, SDH/SONET, PDH/DSn, Carrier Ethernet, SyncE, 1588v2 PTP, Fibre Channel, OTDR, OSA. All supported by a single rugged forward-looking hand-held test platform.

- Optional built-in precision GNSS Receiver and/or Atomic Clock references for frequency and timing applications.
- Extended Sleep Mode (standby) with frequency and phase holdover.
- Flexible Remote Access and Remote Control via EZ Remote, web browser, VNC®, ReVeal RXTS PC software, and SCPI commands.
- Fast test results transfer via USB memory stick and web client.
- Built-in VeExpress client for cloud-based asset management, software updates and licenses. Buy, rent or share licenses.
- Built-in VeSion™ R-Server client for test results upload.
- LAN, WiFi and Bluetooth® management interfaces.
- Intuitive graphical user interface for easy operation.
- 7" color LCD with touch screen.
- High capacity field-exchangeable Li-ion battery pack offers over 30 minutes of continuous operation at 400GE.
- Smallest and lightest multi-rate multi-protocol test platform, weighing 1.86 kg (4.1 lb) including its high-capacity Li-ion battery, and 3.1 kg (6.8 lb) total test set weight with 400GE module.

400G Module Highlights

The RXT-6400 is the industry's first truly portable 400G test set supporting native PAM4 QSFP-DD and OSFP. Equipped to support all common optical transceiver form-factors, this module is a perfect complement to the RXT Platform, extending its testing range to 400 Gbps and offering a future upgrade path for all-in-one 10M-to-400GE testing. Installation, verification, commissioning, evaluation and maintenance tasks are simplified thanks to a combination of intuitive GUI and powerful test functions. Novice users benefit from the easy-to-use GUI, while experienced users will appreciate an array of advanced layer 1-4 features, such as FEC codeword Error distribution analysis, PAM4 pre-emphasis, skew, transceiver check and stress, Lane BERT, Throughput test, IPv4/IPv6 and much more.

General

- Native OSFP and QSFP-DD PAM4 hardware for best-in-class signal integrity (no adapters required).
- 400G Ethernet testing per IEEE 802.3bs specification with KP4 Forward Error Correction (FEC).
- Provides all the necessary features to test transceivers, DAC and AOCs, including OSFP and QSFP-DD transceivers, networking equipment and 400GE links.
- Advanced and flexible state-of-the-art FPGA-based design provides future-proof hardware support for emerging standards, test functions and applications.
- Wide range of supported 400GE interfaces, including 400GBASE-SR8, FR8, LR8, DR4, FR4, LR4, CR8 and CR4.
- I2C/MDIO registers Read and Write.
- Per-lane PAM4 pre-emphasis settings.
- KP4 FEC codeword symbol errors distribution and Skew.

Applications

- Bring-into-service, verification and troubleshooting of high-speed Ethernet links.
- Optical transceivers, DAC and AOC verification.
- Evaluation labs and field support Comprehensive 400GE test applications for layers 1-4.
- Full rate 400GE Throughput and frame loss measurements.
- PCS & RS-FEC layer testing.
- PAM4 signal integrity testing with multi-lane unframed BERT.
- I2C/MDIO verification and programming.
- Advanced optical transceiver test.
- Portable for field testing, evaluations, demonstrations, interop check, benchmarking, troubleshooting, link verification, etc.
- Battery power for mobility within large datacenters, nodes, COs, R&D and evaluation labs.

Test Interfaces

- 1x OSFP PAM4
- 1x QSFP-DD PAM4
- 2x QSFP28/QSFP+ NRZ
- 2x SFP28/SFP+/SFP NRZ
- 2x Clock Input/Output
- 1x Eye Clock Output

PAM4 Interfaces

- Native PAM4 support for 400G QSFP-DD and OSFP transceivers.
- 400GBASE-SR8, FR8, LR8, DR4, FR4, LR4, CR8 and CR4.
- Supports IEEE 802.3bs and MSA compliant transceivers.
- 15W supply supporting power classes 1 through 7.
- Cage temperature monitoring.
- QSFP-DD and OSFP high temperature warning threshold.
- Per-lane post and pre-emphasis settings.
- Lane BERT with independent test patterns.

Advanced Optical Transceiver Test Suite (400GE/100GE/50GE/40GE/25GE/10GE/1G)

- Pre-FEC BER validation on a per-lane basis, over operational voltage and frequency offset range to verify optical module integrity before FEC is applied to the PAM4 signal (400GE interfaces).
- Pre-Framed BER (Lane BERT) validation for non PAM4 interfaces.
- Voltage, temperature, and Pre-FEC BER are monitored and displayed for the duration of the test. A histogram function clearly displays all three measurements for easy correlation and tracking of any abnormal changes.
- Pre-FEC BER and Optical Power threshold settings for PASS/FAIL indication.
- **Pre-emphasis**: Pre-taps, post-taps, and attenuation settings for PAM4 signal conditioning on the host side to help verify and stress transceiver tolerance and performance.
- **Supply Voltage Tolerance Verification**: Sweep range from 3.135V to 3.465V (3.300V +/- 5%) to verify compliance with optical transceiver MSA standard.
- **Power Consumption Verification**: Monitors the optical transceiver's power consumption (Watts), to verify conformance to its specified power class.
- **Temperature Monitoring**: QSFP-DD and OSFP module and cage temperature monitoring with built-in shutdown protection of the optical module if the temperature increases beyond a certain high temperature.
- **Frequency Tolerance Verification**: Sweep range from -100 ppm to +100pm (in 0.1ppm/step), to verify compliance with the 400GE IEEE 802.3 +/- 20 ppm tolerance specification.
- **I2C Baud Rate Sweep**: QSFP-DD and OSFP sweep range 100K to 4000K. QSFP28 sweep range (20K to 1000K).

Stress Test: Pre and Post-FEC Test Suite

- Simple one button pass/fail test for verifying all transceiver properties.
- Advanced user defined thresholds.
- Simple test report includes settings, Pass/Fail, and detailed results.
- Frequency pulling range stress test.
- Pre and Post FEC test.

MDIO Read/Write

- Complete MDIO I2C access.
- Raw read/write capability for all MDIO registers.
- Formal display of commonly used fields.
- Module hardware control pin read/write access.

Optical Power Measurement

- Global and per lane output enable/disable.
- Received per lane and composite optical power level monitoring.

Transmit Clock Sources

- Internal 2.5 ppm VCXO and optional GPS 1PPS.
- Recovered: from the incoming signal.
- External: 1.544 MHz, 2.048 MHz, 10 MHz, BITS/1.544 Mbps, SETS/2.048 Mbps, and 1PPS via 50 Ohm SMA Connector.

Line Frequency Offset Generation

- Line frequency offset generation ±100 ppm in steps of 0.1 ppm.

Line Frequency Measurement Capability

- Displays measured transmit line frequency in kHz.
- Displays measured transmit line frequency offset from reference clock in current, min, max ppm.
- Measures all lanes.

400GE Ethernet/IP Testing

- Layer 2-4 support.
- Throughput (16 streams).
- Service Disruption Time measurements.
- RFC2544.
- PCS/FEC Analysis.
- Multi-lane Unframed BERT Testing.

100GE/50GE/40GE Ethernet/IP Testing

- Throughput (32 Streams).
- V-SAM (ITU-T Y.1564).
- RFC2544.
- PCS Analysis.
- IP Functions: Ping, Trace Route, ARP.
- Loopback: Layer 2 and Layer 3.
- Multi-Lane Unframed BERT Testing.
- Packet Capture.
- Passthrough Monitor Mode (100GE and 40GE).

1GE/10GE/25GE Ethernet/IP Testing

- Throughput (32 Streams on 10GE and 25GE).
- V-SAM (ITU-T Y.1564).
- RFC2544.
- IP Functions: Ping, Trace route, ARP.
- Loopback: Layer 2 and 3.
- Packet Capture.

Multi-lane Unframed BERT Testing

Per lane BERT testing for transceiver and equipment characterization and acceptance testing

Test Patterns

- Modes: 8 x 53.125G.
- PRBS 2^{31}-1, 2^{13}-1, PRBS31Q, PRBS13Q normal or inverted.
- Per lane test pattern selection.
- Pre-FEC error threshold definitionError Generation.
- Bit error per lane and global.
- Insertion: single.

Error Measurement

- Per lane loss of pattern sync.
- Per lane bit error count, average and current bit error rates.
- Aggregate bit error results.
- Events table tracking.

FEC Layer Generation

Skew Generation

- Per lane static skew generation.

FEC Lane

- FEC lane marker swapping and rotation.

Error Generation

- FEC Correctable Codeword, single and rates.
- FEC Uncorrectable, single and rates.
- Invalid Transcoded block.

Alarm Generation

- Per lane FEC alignment marker loss (LOAMPS).
- FEC LOA.
- High SER.

FEC & Skew Layer Analysis

FEC Lane

- FEC lane identification.

Skew Analysis

- Per lane skew analysis in bit time and picoseconds.
- User defined alarm threshold for received skew measurement Error Measurement.
- Supports counts, current and average error rates.
- FEC Correctable Codeword.
- FEC Correctable Symbol.
- Correctable Bits, Ones, Zeroes.
- FEC Uncorrectable.
- FEC Symbol Error Distribution.
- 256B/257B transcoding error.

Alarm Measurement

- Per lane FEC alignment marker loss.
- FEC LOA, LoAMPS.
- High SER.

Ethernet/IP

Traffic Generation/Test Stream Flow

Test flow is generated with a signature field in the beginning of the UDP payload area for traceability and measurement purposes

- MAC/IP/UDP formatted traffic generation.
- IP Version: IPv4 or IPv6.
- MAC/IP/UDP source and destination addressing.
- User defined Ethernet Type, Traffic Class, Hop Limit, Flow label fields.
- Frame sizes: 64 to 16,000 bytes.
- Test Pattern: Variable.
- VLAN tags up to 4 levels with user defined TPID, PCP/QOS, DEI, VID.
- MPLS tags up to 4 levels with user defined label, TC, S(bottom), TTL.

Traffic Rate Generation

- Full rate generation and analysis.
- Constant rate by % BW and Mbps.

Error Generation

- Supports single and rate generation.
- Test pattern bit and sequence errors.
- IP Checksum.

Alarm Generation

- Remote and local fault alarms.
- Auto reply to local fault.

Results

Result Filtering

- Results can be filtered by VLAN tag TPID.

Transmit and Receive Port Counts

- Packets, packets/second, bytes, Mbps, % BW.
- VLAN packets, MPLS packets.
- IPv4 & IPv6 packets.

Receive Port Counts

- UDP, IGMP, ICMP packets.
- Broadcast, multicast, unicast.
- Jumbo, super jumbo packets (greater than 9000 bytes).

Distribution Results

- VLAN distribution by tag level and quality of service level.
- MPLS distribution by tag level and traffic class.
- Packet size distribution for 64, 65-127, 128-255, 256-511, 512-1023, 1024-1518, 1519–max byte ranges with support for counts, percentage and graphing.

Utilization Counts

- Total, IPv4, IPv6, VLAN, MPLS.
- Current, min, max, and average % BW, Mbps, and packets per second statistics for generated and received traffic.

Errors

Displays counts, errored seconds, current and average error rates.

- Code, undersized, invalid FCS, invalid IP.

Alarms

- Loss of link, local fault, remote fault.

Test Stream Results

- Transmitted and received packet counts, byte counts and rate in %BW.
- Test stream sequence errors, bit errors and lost frame counts in errored seconds, current and average rates.
- User-defined pass/fail threshold alarm from sequence errors, bit errors and lost frames.
- Latency min, max, and average measurements in microseconds.
- Packet jitter min, max, and average measurements in microseconds.

Results

- LEDs and detailed statistical counters.
- Graphs and Histograms.
- Event log history showing event, count, day/time, and duration.
- Test reporting options including PDF.

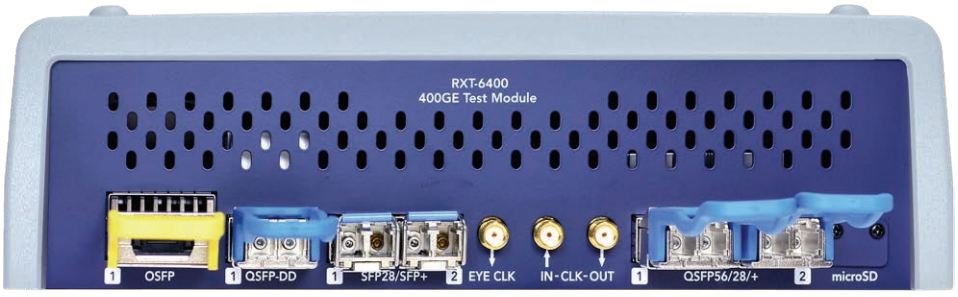
Test Profiles

Supports save and restore of test profiles.

General

Power Consumption	
Active @ 400GE	140 Watts (max)[1]
Environmental	
Operating Temperature	0 to 40°C (32 to 104°F)[2]
Storage Temperature	-20 to 70°C (-4 to 158°F)
Humidity	5% to 90% non-condensing
Dimensions	
RXT-6400 module	208 x 155 x 65 mm (8.2 x 6.1 x 2.6 in)
RXT-1200+ platform	260 x 180 x 65 mm (10.2 x 7.1 x 2.6 in)
Test Set (combined)	260 x 180 x 94 mm (10.2 x 7.1 x 3.7 in)
Weight	
RXT-6400	1.4 kg (3.1 lb.)
RXT-1200+	1.32 kg (2.9 lb.)
9-cell Li-ion battery	0.56 kg (1.0 lb.)[3]

1. Due to 400G high power consumption, it requires RXT-1200+ platform and A01-00-014G 15VDC/9.3-10.7A AC/DC adapter.
2. Range specified up to 100G operation. For 400GE it is recommended to be operated below 32°C (90°F).
3. Requires B02-09-007G high-capacity 400G-ready battery pack.



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